

PRE-

FEASIBILITY

REPORT

**Granite (Building Stone) Quarry owned by Kunhi Muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

PRE-FEASIBILITY REPORT 1.0 INTRODUCTION OF THE MINING ACTIVITY

M. Kunhi Muhammed for Kunhi Muhammed Quarry is proposing an existing (Building Stone) Quarry with Permit at Survey No. 1065 in Melmuri Village, Eranad Taluk, Malappuram District, and Kerala for an area of 0.8939 hectares. The proposed quarry area is hillrock. In most parts of the quarry permit area, the rocks are exposed and also the granite (building stone) exposures are present / bordering to the permit boundary proving the occurrence of the granite (building stone).

The proposed quarry area is located at Melmuri 5 km from Malappuram. The highest elevation of the permit area is 120m MSL and lowest is 75m MSL. As the proposed area is hillock, the drainage of the permit area is towards south - west direction. No habitans are located in the permit area.

The geological resources of granite (building stone) in mining permit area are estimated to be 602641.8 MT. The Blocked Reserves and Mineable Reserve of granite (building stone) in mining permit area are estimated to be 362797.6MT and 239844.2MT respectively. In the first five years of plan period, total 239,000Tons of granite (building stone) shall be quarried/mined. The balance mineral reserves and part of blocked resources shall be quarried after modifying the bench design in next five year period.

Kerala experiences rainfall on duration of 3 to 4 months in a year and the quarry operations will be affected because of the rainy days. The anticipated life of the quarry is 5 years expected.

**Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

1.1 LOCATION OF THE PROPOSED PROJECT

The proposed quarry area is located at Melmuri 5 km from Malappuram. The highest elevation of the permit area is 120 m MSL and lowest is 75 m MSL. As the proposed area is hillock, the drainage of the permit area is towards south- west direction. No habitants are located in the permit area. Exposed rocks in the permit area are marked on geological plan.

BP NO:	LATTITUDE (N)	LONGITUDE (E)
1	11 ⁰ 5' 17.84'' N	76 ⁰ 3' 2.90'' E
2	11 ⁰ 5' 19.41'' N	76 ⁰ 3' 0.11'' E
3	11 ⁰ 5' 22.09'' N	76 ⁰ 3' 0.55'' E
4	11 ⁰ 5' 21.77'' N	76 ⁰ 3' 3.02'' E

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VICINITY MAP



**Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village,
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Figure 1.2 Google Map with site superimposing



**Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village,
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1.2 PROJECT PROPONENT INFORMATION

Name and Address of the Applicant	M. Kunhi Muhammed Palliyali House, Vellur, Pookkottur (P.O), Malappuram (DT), Kerala
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1.3 NEED FOR THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY OR REGION

The major essentiality of building stone is based on its extraordinary compressive strength and durability (among the hardest, dimensional & structural stones) and it is having high tolerance towards the vagaries of nature. In construction activities, these are being used because of its hardness & density, durability and strength craft. The proposed mining project will accomplish its requirement for the construction of buildings, bridges, paving, monuments and many other exterior projects. Polished slabs and tiles are usually used in countertops, flooring, retaining walls and landscaping around a center fountain/ pond, staircase and many

other design elements (residential and commercial applications). It is also known as the maintenance-free stone.

The employment opportunities are being created in connection with the quarrying activities and the local people are being employed for the non -technical activities under the direction of mining engineers and supervisors. For the quarry operations, 12 employees are being deployed which generates ample opportunities for those peoples indirectly.

Applicant will pay royalty for the mineral produced from the mine, direct and indirect taxes will be paid thereby contributing to the regional revenue. The public revenue will further be put for infrastructural development and other sectors like health, education and social welfare.

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1.4 END USE (DOMESTIC/ EXPORT MARKET)

The rock produced from the quarry is transported to the Crusher unit. The aggregate produced is sold to the contractors and to the consumers which is finally consumed locally for road (State Highway & National Highway) & building construction works. Fine Material is also sold for the utilization of the hollow block/ solid block manufactures.

2.0 PROJECT DESCRIPTION

2.1 SALIENT FEATURES & ENVIRONMENTAL SETTING OF THE PROJECT

Particulars	Details
Total Mine Permit area	0.8939 hectares
Total area owned by the proponent	Private owned land by the Project Proponent
Current status of the quarry	Proposed mining area
Local name of the project area (Name of the hill)	Melmuri

Production	The geological resources of granite (building stone) in mining permit area are estimated to 602641.8MT and production / mineable reserves are 239844.2MT . In the first five years of plan period 239,000 Tons granite (building stone) shall be quarried/mined. The balance mineral reserves and part of blocked resources shall be quarried after modifying the bench design in next five year period.
Life of Mine	5Years
Estimated project cost	Rs. 25 Lakhs
Man Power	12 (on permanent / contract basis)
Highest and lowest elevation	120 MSL & 75 MSL
Land use	Private own land
Nearest habitation	There are no houses within 50m radius from the proposed quarry
Nearest town	Melmuri 3.9 km
Stone Crusher & M Sand	Melmuri 3.9 km
Width of access road to the quarry site	7m Quarry/ Private Road
Nearest Airport	Calicut,11.6 km (Air distance)
Nearest Highway	Palakkad- Kozhikode, 1.8 km
Nearest Railway Station	Angadipuram, 19 km(Air distance)
Details of nearby quarry / crusher	Quarry Owned by M. Kunhi muhammed with Survey no : 1065 of area 1.3860 Ha

Power supply	5Hp Generator is used
Water and its Source	<p>The total water requirement is about 2 KLD in which 0.5KLD is for domestic uses, 1KLD for dust suppression and 0.5 KLD for plantation purposes and will be sourced from nearest well water and tanker supply.</p> <p>Domestic consumption : 0.5 KLD</p> <p>Dust suppression : 1 KLD</p> <p>Plantation : 0.5KLD</p> <p>TOTAL : 2 KLD</p>
Nearest Govt. Hospital / dispensary	MBH Hospital , 3.5Km
Education facility	PKM ICS School, 2Km
Fire Station	Malappuram, 6.3 Km
Ambulance	Malappuram, 6 Km
Police Station	Malappuram , 6 Km
Church / temple / mosque	
Electrical installation like transformer /HT line or LT line	Melmuri , 3.9 Km
Mobile Towers	Melmuri, 3.9 km
Defense installations	None within 500m raduis
Archeological Features	None within 500m raduis
Ecological sensitive zones	None within 500m raduis
Nearest streams/ rivers/water bodies (from mine boundary)	Nil
Seismic Zone	Zone 111, Moderate damage risk zone as per BMTPC,

	Vulnerability atlas Seismic zone of India IS: 1893-2002
Categorization as per	As per WGEEP Classification, the project site
WGEEP Report	Is located not in the vicinity of protected area

**Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village,
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PHYSIOGRAPHY / TOPOGRAPHY / DRAINAGE PATTERN

The physiographic of the quarry area is a part of elevated terrain. The topography of the permit area is hilly terrain with granite (building stone) deposit. The highest elevation of the permit area is 120 m. MSL and lowest is 75m MSL. The topographic / surface plan on 1:1000 scales which incorporates all the new details like topography, surface exposures, and structures etc are enclosed in the Mining plan.

2.3 PERMIT HOLD AREA

The quarry site covers the mining area of 0.8939 Ha is a Private own land and in most part of the quarry permit area, rocks are exposed and remaining part with very small amount of top soil and local vegetation.

The permit area does not comprise of any protected or reserved forest lands. Ecologically sensitive features like national parks, biospheres, sanctuaries, elephant corridors, Tiger reserves, flight paths of migrating fauna, etc., are also not visible in this vicinity of core zone.

1.4 GEOLOGY

2.4.1 REGIONAL GEOLOGY

Based on the study of different section available in the area a tentative stratigraphy has been arrived at which is given below:-

Age	Thickness(m)	Lithounits
QUATERNARY	1-15	Soil & Alluvium
	1-10	Beach sand & sand bars
	1-2	Black sticky clay&mud sheel
	4-5	Teri sands&leterite pebble bed
	8-10	Polymitic pebble bed with grit & clay
.....Unconformity.....		
TERTIARY	1-2	Sandstones with clay beds
	2-3	Lignite associated with beds of pluish green clay kalnadu clay
.....Unconfomity.....		
PRECAMBRIAN	Crystalline	Pegmatite and quartz viens
	Rock Instrusives	Dolerit- gabbro
Dharwars		
Charnockite – Khondalite		

(*Secondary Source: - Geological Survey of India-www.gsi.gov.in)

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Soils

The soil types occurring in Malappuram district can be broadly grouped into four types on the basis of their physic-chemical properties and morphological features. They are (a) Lateritic soil. (b) Reverie alluvium, (c) Brown hydro orphic, and (d) Forest loams.

2.4.2 LOCAL GEOLOGY

The local geology belongs to the regional geology. Main rock type in the study area is charnockite. At places where they are exposed, the charnockite is medium to coarse grained with dark grey quartz. The top soil & over burden thickness varies from average 1.3 m to 0.7 m topographically, the area is undulating.

A geological plan showing the granites and soil cover and the geological sections showing subsurface geology is prepared on 1:1000 scales.

Local Geology

Top Soil (thickness in m)	1.3
Over Burden (thickness in m)	0.7

The local geology belongs to the regional geology and topographically the area is hilly. In the permit area, the granite occurs as massive consolidated formation. The geological plan of the area is prepared and attached. Geological cross sections have been drawn at fixed intervals across the permit area in Plate No.3. The section line along which the geological sections have been prepared has been shown in Plate No. 3. The Sections has been drawn across the strike of the host rock.

The soil thickness varies from average 1.3 m to 0.7m whereas granite(building stone) are very well exposed in most part of the site and the evidence of the granite(building stone) is seen in the old worked pits in the nearby areas.

A geological plan showing the granites and soil cover and the geological sections showing subsurface geology are prepared on 1:1000 scales.

Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village, Eranad Taluk, Malappuram District, Kerala

2.5 MINEABLE RESERVES

In this area, the (building stone) exposures are bordering to the permit boundary. The mineable reserves are arrived after deducting the reserves locked in mines safety slope along with boundary in compliance with mineral concession rules. The quantity of such kind of reserves is arrived as following,

SECTION	BLOCKED RESERVE (MT)	MINEABLE RESERVE (MT)	GEOLOGICAL RESERVE (MT)
A-A1	362797.6	239844.2	602641.8
TOTAL	362797.6	239844.2	602641.8

2.6 DETAILS OF MINING

In this area the (building stone) is exposed to surface completely and it is having good market demand, therefore the applicant have proposed to produce building stone from this area. It is also proposed to undertake semi-mechanized opencast mining method by forming suitable benches.

2.6.1 YEAR WISE PRODUCTION DETAILS

The proposed method of mining will be Semi mechanized open cast mining. The basic mining techniques adopted will be uses of machines. For the systematic working of open cast mines, the main development work will be the forming of systematic benching. The height of bench will not be kept more than 5.0m at a time and the width of the benches will be always kept safe according to provisions. The mining will be done with the help of tools such as drills, jack-hammer, compressors, excavators, rock breaker etc. The targeted annual production of Granite (Building Stone) is about 47968.84 MT.

Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village, Eranad Taluk, Malappuram District, Kerala

Table: Year wise production of Granite (Building Stone) for 5 years of mine is given as: - Year

YEAR	BENCHES	MINERALS (M.T)
I	115-120,110-115,105-110, 100-105	47968.84
II	100-105,95-100,90-95	47968.84
III	90-95, 85-90,80-85	47968.84
IV	80-85,75-80,70-75	47968.84
V	70-75,65-70	47968.84

TOTAL	239844.2
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2.6.2 PROPOSED METHOD OF MINING

It is proposed to undertake Open Cast Semi-Mechanized Mining Method.

2.6.2.1 Open Cast mining

The mining will be done by open cast semi-mechanized method of mining. The working will be done by forming benches of 5.0m (Average) height. The Granite (Building Stone) production will be started from the first year. The systematic working of open cast mines, the main development work will be the forming of systematic benching. The height of bench will not be kept more than 5.0m at a time and the width of the benches will be always kept safe according to provisions. The Mining will be done with the help of tools such as drills, jack-hammer, compressors, hand shovel, picks, excavators etc. Loading of material will be done with the help of shovel and excavators at face and at stock yard. The truck / tipper will be used for transportation of material from mine to the destination. The cost of the material is directly dependent on the size of the material mined. First, Rock bench will be opened by removal of Soil / Over Burden and then Stone will be mined out either by labor or with the help of Excavators/Rock Breaker.

**Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

2.6.2.2 Salient features of mining method

The mining will be done by open cast semi-mechanized method of mining. The working will be done by forming benches of 5.0m (Average) height. The Granite (Building Stone) production will be started from the first year. The systematic working of open cast mines, the main development work will be the forming of systematic benching. The height of bench will not be kept more than 5.0m at a time and the width of the benches will be always kept safe according to provisions. The Mining will be done with the help of tools such as drills, jack-hammer, compressors, hand shovel, picks, excavators etc. Loading of material will be done with the help of shovel and excavators at face and at stock yard. The truck / tipper will be used for transportation of material from mine to the destination. The cost of the material is directly dependent on the size of the material mined. First, Rock bench will be opened by

removal of Soil / Over Burden and then Stone will be mined out either by labor or with the help of Excavators/Rock Breaker.

- The cost of the Stone is directly dependent on the size of the material mined. First Stone bench will be opened by removal of Soil / OB then Stone will be mined out either by labor or with the help of JCB / Hitachi.
- 120m to 75m MSL in conceptual phase.
- Considering the stability of rocks the final slope or say ultimate pit slope is proposed 45° from vertical.
- Haul road will be developed up to point of loading.
- Transportation of the mineral from pit-mouth to destination will be by tippers/trucks (10T capacity).

2.6.3 EXTENT OF MECHANIZATION

The details of equipments proposed to be used in mining operation are listed below:

Sl. No.	Machine Type	Required No. of M/c	Size/ Capacity
1	Excavator	1	0.9m3
2	Rock breaker	1	-
3	Compressor	2	CFM/100
4	Tippers/Trucks	2+2(rent)	10T
5	Jack hammer	2	32mm
6	DG set	Nil	-

Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village, Eranad Taluk, Malappuram District, Kerala

2.6.4 CONCEPTUAL MINING PLAN

The highest elevation of the permit area is 120m MSL and lowest is 75m MSL. As the proposed area is hillock, the drainage of the permit area is towards south west direction. No habitans are located in the permit area.

The geological resources of granite (building stone) in mining permit area are estimated to be **602641.8MT** and production / mineable reserves are **239844.2MT**. In the first five years of plan period total **239,000MT** granite (building stone) shall be quarried/mined. The balance mineral reserves and part of blocked resources shall be quarried after modifying the bench design in next five year period.

2.6.4.1 Land Use Pattern

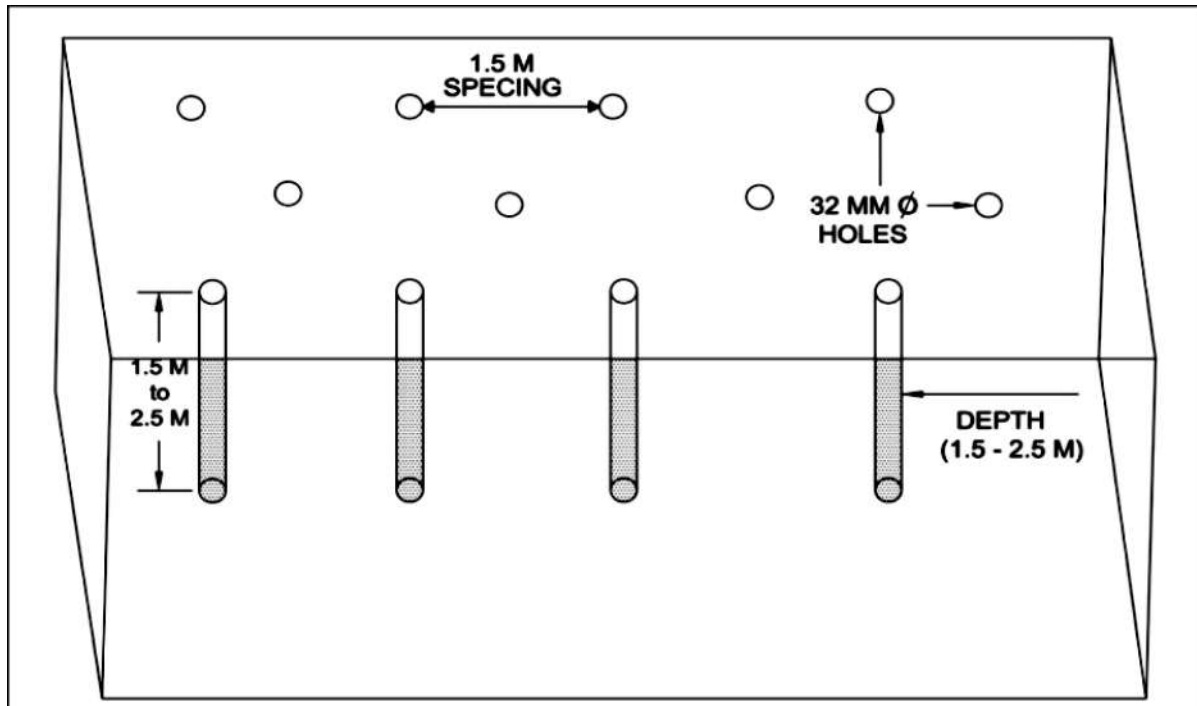
The land use for mining and allied purposes is given below:-

Sl. No	Land use category (Ha)	Pre- Operational (Ha)	Operational (Ha)	Post Operational (Ha)
1	Top soil dump	0.00	0.10 (Outside)	-
2	Over burden	Nil		
3	Excavation	0.3102	0.3123 (0.3Ha) Reclaimed by plantation	0.3123 (Reclaimed by plantation)
4	Road	0.030	0.040	0.040
5	Built up Area	-	-	-
6	Drainage	-	-	-
7	Green belt	0.000	0.2708	0.2708
8	Undisturbed area	0.5537	0.2708	0.2708
TOTAL		0.8939	0.8939	0.8939

**Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

2.6.5 DRILLING

The excavation of mineral is proposed by excavators. The mineral is fractured and easily exploitable by rock breakers and excavators. The hard strata are proposed to excavate after drilling and blasting. The cross-sectional view of drilling operations is shown below:-



2.6.5.1 Salient features of drilling/ blasting

- The top soil shall be recovered and used for afforestation / green belt development / safety barrier development along the periphery of the permit area.
- After exposing the granites, drilling shall be done by jack hammer.
- The blasting shall be carried out by Cartridge Slurry explosives.
- The rock breakers shall be used to break the oversize boulders left after blasting.

**Granite (Building Stone) Quarry owned by Kunhi Muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

- The blasted material and the broken material by rock breakers shall be loaded to the tippers by excavator and transported to the crushing and screening plant located outside the permit area. The crushing and screening shall be carried out by using primary and secondary crushers and the screens of 20mm, 12mm, 10mm & 6mm opening.
- The finished product shall be stacked in the crushing and screening plant area from where it shall be dispatched to the consumer directly.

2.6.6 BLASTING

The blasting design system is properly planned with ideal spacing and burden patterns, ensuring appropriate stemming column and reduced optimized explosive charge, so that ground vibratory effects are less, fly rocks, etc are properly regulated and controlled. The blasting pattern depends on the strata conditions of the rocks. Since the material in the site is Charnokite which is medium hard to full hard in nature, it requires drilling and blasting to exploit the same. Since conventional semi mechanized open cast method of quarrying/mining is done using drilling and blasting, the same is adopted in this mine/quarry. The drilling and blasting parameters are as given below,

Depth of each hole	: 1.0m to 1.5m
Diameter of the hole	: 32mm
App. Spacing between hole	: 1m to 1.5m
App. Burden	: 0.7 to 1.3
Hole pattern	: Multi row staggered pattern
Explosives to be used	: Cartridge Slurry / electric delay detonators

**Granite (Building Stone) Quarry owned by Kunhi Muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

2.6.6.1 Blasting Safeguard

- Blasting in the open cast pit will be done only during day time at designated hours.
- Maintaining safety distance all around the magazine as per statutory requirement,
- Only Competent blasters will be appointed to handle explosives.
- Proper, safe and careful handling and use of explosives by competent blasters having Blasters Certificate of Competency issued by DGMS
- Proper security systems to prevent theft/ pilferage, unauthorized entry in to Magazine area.
- Controlled blasting technique will be adopted by varying burden, spacing & charger per hole depending upon the field condition.
- Holes will be located beyond the weak zone after proper inspection of the site.
- No loose pieces will be kept on the bench slopes during blasting.
- Stemming materials and stemming length will be chosen suitably.
- Proper compaction of the stemming material will be undertaken before blasting.
- Carrying out blasting during designated time only that too day time only and displaying a board in the mine entrance specifying the blasting time.
- Posting guards at boundaries of the permit area and giving warning signal by way of whistle or siren blowing before blasting, to prevent unauthorized entry and to prevent mishaps.
- Avoiding blasting during lightening and high wind period,
- The holes which have been charged with explosives will not be left unattended till blasting is completed.

**Granite (Building Stone) Quarry owned by Kunhi Muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

2.6.6.2 Types of Explosive Used

Only class 2 and class 6 explosive is proposed for use as given below:-

SL.NO	NAME AND DESCRIPTION	CLASS & DIVISION	SUB-DIVISION (IF ANY)
1	Nitrate Mixture	2,0	0
2	Safety Fuse	6,1	0
3	Ordinary Detonator	6,3	0
4	Electric Detonator	6,3	0

STORAGE OF EXPLOSIVE

Considering low consumption, a 100Kg magazine exists for storing the explosive. The magazine is located about 4km away from mine boundary. The controlled blasting is proposed by adopting all the safety measures as per “MMR 1961” and with the permission of DGMS. Blasting will be performed as per requirements on the face. The explosives are supplied by authorized dealers and the blasting will be carried out under personal supervision of DGMS approved Blaster/Mate.

PRECAUTIONS:

- a. Proper and safe storage of explosives in approved and Licensed Magazine.
- b. Proper, safe and careful handling and use of explosives by competent Blasters having Blaster’s Certificate of competency issued by DGMS.
- c. Proper security system to prevent theft/ pilferage, unauthorized entry in to magazine area and checking authorized persons to prevent carrying of match box, lights, mobile phones, cigarette etc.
- d. The explosive of class two will be used in their original cartridge packing and such cartridge shall not be cut to remove explosive for making cartridge of different size.

**Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

- e. Detonators will be conveyed in special containers. Thus will not be carried with other explosives.
- f. The holes which have been charged with explosives will not be left unattended till blasting is completed.
- g. Before, starting charging clear audible warning signal by Sirens will be given so the people nearby can take shelter.
- h. Blasting operation will be carried out in the times only at designated hours as in this project in the mining operations are proposed to be carried out in the day time only.

2.7 MINERAL TRANSPORTATION

Loading of mineral will be done by excavator and will be sent to the crusher located outside the permit area for sizing. Trucks / Tippers of 10T will be used for transportation of mineral from mine site. It is expected that 10-12 trips will be required to transport on daily basis. For this, movement of truck per hour will be 1-2 only. Thus, the impact due to movement of trucks from the mine will be marginal.

2.8 EMPLOYMENT POTENTIAL

An office is available in the mine area.

The total number of employees including skilled and un-skilled workers is 12 which include workers for mine and ancillary unit. The details of the staff and workmen employed in the mine are given below:-

TOTAL TEAM OF QUARRY OPERATION		
Sl. No.	NAME OF THE POST	NOS.
1	HIGHLY SKILLED	2
2	SKILLED	3

3	SEMI- SKILLED	5
4	UN-SKILLED	2
	TOTAL	12

Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village, Eranad Taluk, Malappuram District, Kerala

2.9 WATER REQUIREMENT & SOURCE

The total water requirement for the proposed activity is 2 KLD. The detailed breakup of the same is given below:-

SI No:	Particulars	Quantity (KLD)
1	Domestic purpose	0.5
2	Dust Suppression	1
3	Plantation	0.5
	TOTAL	2

The total water requirement is about 2 KLD in which 0.5 KLD is for domestic uses, 1 KLD for dust suppression and 0.5 KLD for plantation purposes and will be sourced from nearest well water and tanker supply. The topsoil and overburden is stored which is totally protected from leaching away by the running water and proper sediment trap is used for limiting the sediment transport. It is proposed to collect the storm water into the Holding/ Siltation Tank by constructing channels all around the foot of hill. The channels will be constructed with

intermediate check dams to prevent soil erosion. The sizing of the channels will be 1m x 1m. The details of storm water management are given in EMP section.

2.10 POWER

5Hp Generator is used.

Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village, Eranad Taluk, Malappuram District, Kerala

ENVIRONMENTAL MANAGEMENT PLAN

BASELINE ENVIRONMENT

The baseline environment quality represents the background environmental scenario of various environmental components such as air, noise, land, ecological and socio-economic status of the study area. Field monitoring studies was carried out by Poluchem Environmental & Analytical Laboratories to evaluate the base line status of the project site in compliance with district DEIAA guidelines.

3.1 AIR ENVIRONMENT

The prime objective of the baseline air monitoring was to evaluate the new air quality of the area. This will also be useful for assessing the conformity to standards of the ambient air quality during the operation of the proposed mine. Quality of present ambient air is within permissible limit. There is no industrial activity in and around the permit area.

The mining has been proposed by semi-mechanized open cast method. Water spraying will be done on haul/service roads, mining area, loading and unloading places etc. There will not be any significant impact on ambient air quality.

Field monitoring studies for 24 hourly frequencies was carried out to evaluate the base line status of the project site in compliance with district DEIAA guidelines.

Ambient Air Monitoring Instruments

Parameters	Test method	Unit	Results
Particulate Matter	IS 5182 Part 23	µg/m ³	40.9
(PM10)	2006		
Particulate Matter (PM2.5)	EPA 40 CFR Part 50 Appendix-L	µg/m ³	19.1
Sulphur dioxide (SO ₂)	IS 5182 (Part – II) 2001, with Improved West & Geake Method	µg/m ³	<2.00
Nitrogen dioxide(NO ₂)	IS 5182 Part 6 2006	µg/m ³	<2

Results & Conclusions: The results obtained are given in Mining Plan It is seen that the ambient air monitoring results obtained are well within the prescribed standards (NAAQS) with respect to PM10, PM2.5, NO₂ and SO₂.

3.2 WATER ENVIRONMENT

The purpose of this study is to:-

- Assess the water quality characteristics for critical parameters;
- Evaluate the impacts on agricultural productivity, habitat conditions, recreational resources and aesthetics in the vicinity; and
- Predict the likely impacts on water quality due to the project and related activities.

**Granite (Building Stone) Quarry owned by Kunhi muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

The sample was collected by grab sampling technique. The sample was analyzed as per the procedures specified in 'Standard Methods for the Examination of Water & Wastewater' published by American Public Health Association (APHA).

Results & Conclusions: -

There is no water regime of any importance in the proposed area. Drinking water is made available through tanker supply. This water is being used for drinking purpose from many years. Detailed Report of Water Quality of the proposed site is enclosed in the Mining Plan.

3.2.1 HYDROGEOLOGY

Ground water occurs under phreatic, semi-confined and confined conditions in the above formations. The weathered Charnockites, Granite gneiss, schist's and literates form the major phreatic aquifers, whereas the deep fractures in the Charnockites, Granite Gneiss & schist's and the granular zones in the Tertiary sedimentary formations form the potential confined to semi confined aquifers.

The Archaean rocks: - The shallow aquifers of the Archaean rocks are made up of the highly decomposed weathered zone or partly weathered and fractured rock. Thick weathered zone is seen along the midland area either beneath the Literates or exposed. In the hill ranges,

thin weathered zone is seen along topographic lows, area with lesser elevation and gentle slope. In areas along the hill ranges generally rock exposures are seen. The depth to water level in this aquifer varies from 2 to 16 mbgl and the yield of the well ranges between 2 to 10 cu.m. Per day.

Laterites: - The depth to water level in the formation ranges from less than a meter to 25 mbgl. Laterite forms potential aquifers along valleys and can sustain medium duty irrigation wells with the yields in the range of 0.5 - 6 cu.m. Per day. The occurrence and movement of ground water in the laterites are mainly controlled by the topography.

**Granite (Building Stone) Quarry owned by Kunhi Muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

Literate is a highly porous rock formation, which can form potential aquifers along topographic lows. However, due to this same porous nature, groundwater is drained from elevated places and slopes at shortest duration after monsoon due to which scarcity is experienced in the elevated places and slopes.

3.3 NOISE ENVIRONMENT

The main objective of noise monitoring in the study area is to establish the baseline noise levels and assess the impact of the total noise expected to be generated during the project operations in the project site.

Noise level during day time varies from 51.5dB (A) to 53.1dB (A) and during night time it varies from 33.7dB (A) to 34.6dB (A).

Noise (Sound Measuring Instrument

Instrument	Make	Model No.	Instrument Identification	Detection Limit
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Integrated Sound Level Measurement Instrument Standard Accessories	Lurton	SL-4001	SAL/NOISE/INT/01	Lo 30-80dB Hi 80-130dB
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Eranad Taluk, Malappuram District, Kerala**

Particular	Testing Method to be Followed	
Noise Level Measurement		
A	Noise Level in dB (A) for continuous 24 hours at 1 hour interval	Operational Manual of Noise level Meter, Model No. DT - 805 issued by Mextech

Vibration levels (due to blasting)

The drilling is proposed by jack hammer with 32mm dia. The blasting shall be done individually. Due to very small diameter hole blasting the vibration in this area shall be very minor.

Results and conclusion:-

It is seen from the obtained results that the Noise levels are well within the prescribed national standards is enclosed in the Mining Plan.

3.4 BIOLOGICAL ENVIRONMENT

Primary survey for flora and fauna studies has been conducted in the core zone.

FLORA

Flora in the project area.

TREES

Sr. No.	Name of Species	Vernacular Name / English Name	Family	Habitat	Distribution
1.	<i>Tectona grandis</i>	Coconut Tree	Arecaceae	Evergreen and semi-evergreen forests, also widely cultivated	Widely cultivated in the tropics, origin is probably South India

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Study of biological environment is one of the important aspects in Environmental Impact Assessment in view of the need for conservation of Environmental quality. A detailed study has been carried for enumeration of species. Occurrences of flora at various locations were observed and typical plant species were collected. The visual observations of plants were recorded with a view to obtain some idea about the relative density of certain species and their predominance.

Conclusion: - There is no flora species at site which are in the red listed category or scheduled species category.

3.4.2 FAUNA

FAUNA: Observed in the area are:-

Common Name	Scientific name	Habitat	IUCN Status

Crow	<i>C o r v u s brachyrhynchos</i>	Plantation, habitation	Least Concern
Sparrow	<i>Passer domesticus</i>	Plantation, habitation	Least Concern

Conclusion: - There is no fauna species new at site which are in the red listed category or Schedule -I species category.

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Eranad Taluk, Malappuram District, Kerala**

SOCIO-ECONOMICS

Social and demographic profile:

The mine is situated in the remote area, where the socio- economic status of the people is not satisfactory. The main occupation of the people is farming and there are no major industries in this area. The quarrying operation in such remote places would provide 12 direct & indirect employments to local people. Hence, quarrying operation will help in improving socio-economic status of the area. It is expected that mining can boost the gross economic production of the area other than industrial activities. It provides new avenues of direct or in direct employment and business. These coupled with growth in infrastructural facilities results in improved socio-economic prospects.

The mining in the region will open the gates for socio-economic upliftment of the area. People will be employed in the mines and will be self-employed in the ancillary works. People will be getting better facilities of communication and amenities due to mining activities in the region.

Occupational health and safety hazards:

The statutory norms shall be followed during the course of quarrying to ensure the proper health and safety of workers. Apart from this there is no other factor envisaged during the quarrying operations.

Historical monuments etc.

There are no historical monuments in the core or buffer zone.

Topsoil & Overburden Management:

The granite rock is situated in a sloping terrain. There is no generation of waste material from these quarry operations during these five years of plan period.

Totally 5,385 cu. m topsoil is expected to be removed during the mining operation. The topsoil shall be used for afforestation / greenbelt development all around the quarry area. The land use pattern is given below with all the details. The road will have width of atleast 7m.

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The details of land area indicating the area likely to be degraded due to mining will be as under:

Sl. No	Land use category (Ha)	Pre- Operational (Ha)	Operational (Ha)	Post Operational (Ha)
1	Top soil dump	0.00	0.10	-
2	Over burden	Nil	(Outside)	
3	Excavation	0.3102	0.3123 (0.3Ha) Reclaimed by plantation	0.3123 (Reclaimed by plantation)
4	Road	0.030	0.040	0.040
5	Built up Area	-	-	-
6	Drainage	-	-	-
7	Green belt	0.000	0.2708	0.2708
8	Undisturbed area	0.5537	0.2708	0.2708
TOTAL		0.8939	0.8939	0.8939

Year wise Proposal for reclamation of land:

As the mining will progress, the areas where ultimate pit depth is reached, backfilling will be started. This will reduce the transportation of OB and waste outside the pit area. There is proposal of backfilling and re-contouring during the next three years of this mining plan. The reclaimed area may also be considered for plantation to develop green belts. Abandoned pits will be utilized for water storage during rainy season. This water will be utilized for irrigation and plantation etc. It will also help in recharging the ground water.

At conceptual stage, the pit shall be developed for pisciculture. Since the granite rocks are exposed no waste will be generated in the area and as such no external waste dumping is required. In the mine closure stage, the entire mined out area of 0.6301Ha will be reclaimed back with bench plantation / plantation. The mined area will be properly fenced all around.

**Granite (Building Stone) Quarry owned by Kunhi Muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

It is also suggested to construct a retaining wall where all required and also a garland drain for collection of rain water at the bottom. Silted water if any will be collected in the garland drain which in turn will flow into settling pond. Supernatant clear water will be let out of the area after passing through silt traps.

Afforestation Programme

The year wise programme of eco-restoration for the life of mine, about 250 trees will be planted in an area of 0.2708 ha. Biological reclamation / ecological restoration for the mined area by plantation of the species as per the time schedule suggested below: -

First Six months -- Herbs & grass

Next Six months -- Shrubs

Next Six months onwards -- Trees

Selection of species is based on High Dust Capturing, Soil Holding Capacity, ground water recharge capacity etc. More focus is given for medicinal plants.

Plantation along the boundary of the permit area i.e. within 7.5 m barrier of the permit area boundary has been proposed which will help to improve the environment and ecology. Plantation will be done around offices, road side and fencing boundary etc.

Treatment and disposal of water from mine:

Except during monsoon months, no water shall be discharged from mine. A garland drain shall be made all around the quarry to divert the water away from the pit through silt settling tank. The rain water shall be diverted to its natural course.

Measures for minimizing adverse effects on water regime:

The water that would be encountered in the project is rainwater. A garland drain shall be made all around the periphery of quarry to divert the water away from the pit. The water shall be collected at silt settling tank before diverting that to its natural course. However granite (building stone) is not toxic and hence there shall not be any chemical hazardous effect.

Granite (Building Stone) Quarry owned by Kunhi Muhammed at Melmuri Village, Eranad Taluk, Malappuram District, Kerala

Protective measures for ground vibrations/air blast caused by blasting:

The drilling is proposed by jack hammer with 32mm dia. Due to small diameter hole blasting the vibration in this zone shall not be even noticeable. The nearest Village Pookkottur is situated at about 2 km away from the mine. However the measures like monitoring every blast and use of minimum explosives shall be taken.

Habitat, settlements, disturbed due to mining activity:

There are no historical monuments in the core or buffer zone.

Socio-economic benefits arising out of mining:

Social and demographic profile: The proposed mining area is situated in the remote area, where the socio-economic status of the people is not satisfactory.

There are no major industries in the area. The quarrying operation in such remote places would provide direct & indirect employment to local people. Hence quarrying operation will help in improving socio-economic status of the area.

Monitoring schedules for different environmental components after the commencement of mining operations and related activities

For this quarrying project a quarterly monitoring mechanism for various environmental parameters shall be evolved if needed as per the guidelines issued by District Environment Committee.

Waste Management:

There is no generation of waste material (except the top soil) from these quarry operations during these five years of plan period.

Top Soil Management

A total quantity of 5385cu.m of topsoil is proposed to be removed during the mining operations. The topsoil excavated from the quarry will be dumped separately at pre-determined place and subsequently will be utilized in spreading over reclaimed areas for plantation. Precautions will be taken to limit the height of the topsoil dump to 5 to 6 meters in order to preserve its fertility and shelf life. It will be suitably protected from soil erosion and infertility by planting fodder grass and leguminous plants during temporary storage.

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Safety & Security:

For safety the permit hold areas shall be fenced with proper gates which shall be guarded by security personals.

Disaster Management & Risk Assessment:

No disaster is expected in this small scale of quarrying; however as an emergency the location of the hospital, police station and fire brigade is given in the Table.

Table No. 12.3: Location of Stations during Emergency from Quarry

Stations	Location of Stations	Distance
Hospital	MBH Hospital	3.5 Km
Police station	Malappuram Police Station	6.3km

Fire Brigade	Malappuram	6.3km
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In case of any eventuality the following person will be available for contact.

M. Kunhi Muhammed

Palliyali House, Vellur

Pookkottur (PO)

Malappuram District, Kerala

Care and maintenance during temporary discontinuance:

The following specific measures shall be taken during temporary discontinuance,

- a. The pit shall be fenced.
- b. Proper and adequate security at the entrance to the mine to prevent entry of unauthorized person with proper gates under lock.
- c. All the above will be examined by manager once in a week to ensure that they are in order.

**Granite (Building Stone) Quarry owned by Kunhi Muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

4.0 ENVIRONMENT MONITORING PROGRAM

Environmental monitoring program is a vital process of any management plan of the development project. This helps in signaling the potential problems resulting from the proposed project and will allow for prompt implementation of effective corrective measures.

Environmental monitoring will be required for the operation and closure of mining operations.

The main objectives of environmental monitoring are:-

- Ø To assess the changes in environmental conditions,
- Ø To monitor the effective implementation of mitigation measures,
- Ø Warn significant deteriorations in environmental quality for further Prevention action.

4.1 REPORTING & DOCUMENTATION

All the necessary reports and documents shall be prepared to comply the statutory rules & regulations. Proper and due care shall be taken to adhere to the laid down rules and regulations by the government.

Regular and periodic record shall be kept in order to ensure easier, comparable and brisk review and projection of past, present and future performances. Also, the management shall ensure to prepare separate records for water, wastewater, solid waste, air, emission, soil & manure regularly and periodically in order to provide better and smooth vigilance.

The management shall look into the fact that as soon as the report is prepared, it shall be forwarded to the concerned authority with due care for the purpose of reviewing.

**Granite (Building Stone) Quarry owned by Kunhi Muhammed at Melmuri Village,
Eranad Taluk, Malappuram District, Kerala**

Adhering to the rules and regulations the management shall ensure that the outcome of the reports and the conclusions drawn shall be prepared as per the laid down regulations and procedures. No breach of any convention shall be availed.

These reports/documents shall be regularly and periodically reviewed and any changes/discrepancies found in mitigation measures/ operation/ management/ shall be brought into notice instantaneously and all possible corrective actions shall be taken.

5.0 CONCLUSION

It is anticipated that socio-economic impact due to this project will positively enhance the raw materials for the developmental concerns and also may provide ample chances of more employment opportunities for local inhabitants. There are no Resettlement and Rehabilitation issues and litigations in any courts of law pending involved in this project. The project infrastructures can be utilized for the benefit of the local people of the area. The revenue of the State Govt. will be definitely increasing due to the proposed activity by means of CRP as well as the processing fee for appropriate statutory clearances involved in the procedures. The entire project area is devoid of any endangered flora and fauna as specified in the IUCN records and the area is totally far from any other protected areas under the Wildlife Protection Act as well as the Forest Act. It is proposed to reclaim the land and develop green cover for eco-restoration with native species to a maximum extent as far as possible. Thus, the proposed project is not having any possibility in generating untoward changes which is capable for altering the equilibrium status of the environment or adjacent ecosystem adversely.

